2006

Nuclear Weapons Proliferation: 2016

Lavoy, Peter R.

Nuclear Weapons Proliferation: 2016

Conference Report:

Nuclear Weapons Proliferation: 2016

Monterey, California, July 28-29, 2006

Conference organized by the Center for Contemporary Conflict, U.S. Naval Postgraduate School

by Dr. Peter R. Lavoy and Mr. Robin Walker

For a printable version of this report, please click here.

Please note: The papers from this conference will be published in a special issue of Non-Proliferation Review at: http://cns.miis.edu/pubs/npr/.

Introduction

On 28 and 29 July 2006, more than 60 government officials, military officers, scholars, and non-governmental experts gathered at the Naval Postgraduate School to discuss potential long-term nuclear proliferation threats (over the next ten to fifteen years). The event was organized by Peter Lavoy, director of the Center for Contemporary Conflict (CCC) and sponsored by the National Intelligence Council (NIC) and the National Counterproliferation Center (NCPC) to look "over the horizon" and examine the factors that are most likely to influence national motivations and capabilities for nuclear weapons proliferation in the 2016 timeframe.

Topics of discussion included theoretical insights on nuclear proliferation, lessons learned from past and current cases of nuclear proliferation and nuclear reversal, potential future cases of nuclear proliferation, and likely changes in the international proliferation environment. Ten of the more significant findings from the conference discussion are:

- ***Two theoretical perspectives compete to explain most proliferation phenomena.*** The *realist* perspective, which holds that states pursue nuclear weapons to offset international security threats, generally explains most cases of proliferation. However it cannot explain the timing of proliferation decisions because it is conducted at a systemic level of analysis and thus cannot account for specific internal political or psychological factors involved in any nuclear weapons program. At that level of analysis, the *idealist* perspective does a better job, as it is concerned with national, cultural, or individual attributes, and thus can capture key shifts in the motivation and decision-making of specific states.
- ***Decisions to go nuclear are made by individuals, so understanding the psychological mindsets of individual leaders is crucial to nonproliferation efforts .*** Leaders of a country typically make the ultimate decision to start a nuclear program and continue to make or test an actual bomb. Based on historical experience, those leaders can on occasion be persuaded not to pursue nuclear weapons, especially when fellow heads of state make pointed appeals.
- ***Apart from national leaders, influential figures both within states and at the international level can have a profound influence on states' decisions of whether and how to pursue nuclear weapons.*** Knowing who these "mythmakers" are, the substance of their beliefs and claims, and the influence they have within a country at any given time can allow outside analysts and decision-makers to make more accurate predictions about the direction and speed of that country's attempts to obtain nuclear weapons.
- ***Nuclear bomb programs can acquire a self-perpetuating technological momentum, which can propel the program faster than the political decisions to develop nuclear weapons or the strategic judgments about what to do with them*** . In some countries the nuclear program is moving quickly and strong enough that it may not be possible to point to a single point of decision about making a device. Or, to put it differently, nuclear development programs are divided into dozens or even thousands of political, technological, and financial decisions, not one of which, on its own, might be sufficient to derail the overall program.
- ***"Disaffected disarmers," countries that abandoned nuclear bomb programs in the past but maintain some capability, are some of the biggest threats to restart nuclear weapons development programs.*** These countries can rearm quickly and may view themselves as major regional or international powers with a right to nuclear weapons. Even more significantly, the forces that motivated their original quest for nuclear weapons might reassert themselves as either the international security environment or domestic ruling elite changes.
- ***Engaging diplomatically with actual or potential nuclear problem states can often buy enough time for the international community to develop long-term nonproliferation solutions, or for other unforeseen forces, such as the change of national leadership, or a severe economic crisis, to reorient the priorities of the proliferating state.*** In this spirit, the Chinese consistently have attempted to engage North Korea as part of a longer-term effort to convince them to give up their nuclear weapons program. This strategy ultimately proved effective in convincing Argentina, Brazil, and South Africa to abandon their nuclear weapons programs.
- ***Membership in international political, economic, or security institutions, such as NATO and the European Union, can play a major role in constraining nuclear proliferation.*** This has proved especially true in Europe, where institutional membership has been a carrot that has kept states with the potential for nuclear armament from developing nuclear weapons. These institutions work on both a realist level, providing for allies to ensure mutual defense, and on an idealist level, allowing countries to develop closer ties, reorient their priorities, and to work cooperatively to solve pressing problems.
- ***There are several new factors that could fundamentally change the proliferation environment in 2016.*** Some observers worry that a renewed interest in nuclear energy could trigger a new round of nuclear proliferation. However, even a sharp increase in the demand for nuclear energy would not have a significant impact, because the lengthy lead-time for reactor production and commissioning means that 2016's reactors would already be well along the development stage now. However, in twenty years, real problems could emerge. More disconcerting is the potential rise of non-state actors in the supply side of the proliferation market, as evidenced by the A. Q. Khan proliferation network. Khan might have shown the way for more to follow.
- ***On the whole, the U.S. intelligence community has done a good job of providing timely warning of significant proliferation events.*** Despite well-known intelligence failures, such as incorrectly anticipating the timing of the Soviet Union's first nuclear weapons test or both sets of India's 1974 and 1998 nuclear tests, it has provided policymakers with an accurate assessment of proliferation dynamics. However, in many of these cases, policymakers have been unable (or unwilling) to effectively influence the proliferation motivations or behavior in question.
- ***The U.S. government has generally done a better job in constraining nuclear proliferation when it could significantly offset the security threats facing a potential proliferator .*** For example, Washington was able to discourage Japan, South Korea, and Taiwan from ramping up nuclear bomb programs by demonstrating its commitment to their security. However, in cases where the United States was a perceived threat, such as Iran or North Korea, U.S. nonproliferation efforts have been much less effective. And in cases where the nuclear aspirant was threatened by its neighbors in a region in which the United States did not want to become too involved, such as in South Asia and Southern Africa, Washington's nonproliferation tool kit was insufficient to curb nuclear proliferation.

The Theoretical Literature: Concepts, Drivers, Indicators, and Debates

Jacques E. C. Hymans, a Smith College professor, discussed possible theoretical reasons to explain the disparity between the roughly 40 nuclear-capable states in the world today and the relatively few actual nuclear weapons states. Hymans challenged the realist theoretical paradigm, arguing instead that ideas are as important as power in driving and combating proliferation. The idealist perspective maintains that current supply-side efforts to reduce the spread of nuclear material are worthwhile, but in the long run attempts to curb nuclear demand will prove more effective.

The relatively limited historical demand for nuclear weapons can at least partially be explained by ideas on three levels: 1) international-level idealism, or the power of the international nonproliferation norm, 2) domestic-level idealism, or the contest between domestic mythmakers for or against nuclear weapons, and 3) individual idealism, or the emotional needs of individual national leaders. Of these factors, Hymans sees the best indicator of nuclear intention as the individual and idealistic approach, emphasizing what makes a leader decide to go all the way to a nuclear device. One factor may be the level to which an individual leader is both nationalist and oppositional, speaking of another country as an opponent or enemy. In a study of Australian leaders' speeches Hymans found that those leaders who expressed both strong nationalistic ideas and viewed other countries as threats were most likely to take steps towards nuclear weapons.

The Intelligence Community's Past Performance in Anticipating Nuclear Proliferation

While discussing the U.S. intelligence community's past role in comprehending and countering nuclear proliferation, Torrey Froscher analyzed several past cases of failure and success, including the Soviet Union, China, India, Libya, Iraq, and the A. Q. Khan network. In the Soviet case, the U.S. intelligence community failed to follow the information it had to its logical conclusion and the Soviet Union detonated its first device a full year earlier than predicted. Froscher argued the United States was too dependent on its analysis of Soviet sources of high-grade uranium as an indicator of shortcomings in the Soviet program. As time went on and the U.S. intelligence community gathered more information about the Soviet program its predictions became more precise but less accurate. Early U.S. assessment of China's nuclear program was fairly accurate, but for the wrong reasons. Intelligence from satellites provided large quantities of good information, but the intelligence community missed some major developments by assuming the Chinese would follow the Soviet path in using plutonium. Though the end prediction of a test date proved to be fairly accurate the evidence cited to support that prediction was quite inaccurate, a situation that could have proved disastrous if the United States attempted to use military force to neutralize the Chinese nuclear capability

India was a partial success story for the U.S. intelligence community, which recognized the likelihood that India would attempt to go nuclear if China did, but failed to predict the 1974 nuclear test. In the 1990s the U.S. intelligence community fairly accurately predicted the likelihood of an additional test, but once again failed to predict the specific timing of India's May 1998 tests. An additional success story was Libya, where the intelligence community made a major contribution to frustrating Libya's WMD acquisition efforts from the 1970s through the 1990s. The penetration of A. Q. Khan's network ultimately helped persuade Qadhafi to give up his quest for nuclear weapons. The U.S. intelligence estimates concerning Iraq were the poster child for intelligence failure, and drew incorrect conclusions because of a lack of solid intelligence in both the early 1990s and in the 2001-2002 period. Prior to the first Gulf War the U.S. intelligence underestimated the status of Iraq's WMD programs, while prior to the 2003 Iraq War it overestimated the progress Saddam Hussein had made in re-starting his program after the United Nations inspectors left in 1998.

Froscher stated that the ground truth often will diverge from advance assessments and that even the intelligence community's successes will not ever be totally right. While specific information can be invaluable in combating proliferation of nuclear weapons, incorrect information can be worse than a lack of information. Many reports on intelligence reform have come up with similar recommendations, reducing stove piping and groupthink, better coordination of efforts, etc. However even those reforms will not ensure success in targeting nuclear programs. The divide between intelligence analysts and policymakers is wide, and improving the relations between those two communities will be a crucial factor in the U.S. government's efforts to combat nuclear proliferation.

(From left) Peter Lavoy, Jacques Hymans, Torrey Froscher, and Lewis Dunn.

The Policy Community's Past Performance in Countering Nuclear Proliferation

Lewis Dunn, a former U.S. nonproliferation official, argued that alarmist predictions of nuclear proliferation have been wrong over the last 40 years mainly because the United States allowed nuclear capable states, including Japan and most of Europe, to become security free riders during the Cold War, eliminating their need for nuclear weapons. Now the question is how strong and lasting the U.S. alliances will prove to be. If they are strong enough, they can keep Turkey out of the "nuclear club." If they prove too weak to prevent Iran from arming itself, the rest of the Gulf states could very well follow.

Nonproliferation institutions have proven to be enduring and effective, with most countries adhering to the nuclear nonproliferation treaty (NPT). Unfortunately some countries believe the NPT is about disarmament rather than preventing the spread of nuclear weapons. This leads some countries to become "disaffected disarmers" which feel they have been unfairly forced out of the nuclear weapons game and see themselves as potential regional great powers. These disaffected disarmers include Brazil and South Africa, and may have a strong desire and potential to rearm as international circumstances change. Over the past 50 years the United States has proven to be less effective at sustaining institutions such as the NPT, and Dunn warned that unless we do better we risk major proliferation problems.

Traditionally, other strategic interests have trumped nonproliferation, and probably this will continue to be the case unless the international system is stressed by some kind of shock, such as the use of a nuclear weapon, Iran leaving the NPT, or potentially the U.S.-India nuclear deal. Shocks to the international system can lead to flurries of rearming, as countries with the technical capability currently on the "third tier" of the watch list could seize the opportunity to ramp up their nuclear weapons production programs.

Dunn discussed the idea that taking some action, no matter what, can often prove effective because it buys time to develop a longer-term solution. Given enough time South Africa decided to dismantle its program. The Chinese are using this strategy trying of buying time with North Korea, hoping they will give up their program. However, as Peter Lavoy and Jacques Hymans have stressed in their writing, once a country "crosses the Rubicon" in their program, whether through conscious decision or not, their programs often become self-perpetuating, as in the cases of the French and Israeli nuclear programs.

While the United States and other countries attempting to stop proliferation are innovative in their nonproliferation and counterproliferation methods, Dunn stressed that proliferators also innovate. Every new country that has obtained nuclear technology has helped at least one other country obtain that technology (with the exception, so far, of India). In some cases, focusing on making sure a country does not get nuclear weapons means ignoring other foreign policy considerations, as in the case of Libya. Additionally a problem country is never truly

solved. As Dunn mentioned, in 1987 after two years of work the U.S. government "solved" the North Korea problem for the fifth time, which clearly has not worked out so well. Other potential unsolved problem countries include old Soviet states in Central Asia.

Panel Discussion

The ensuing panel discussion focused on the role of nuclear doomsayers in marshalling the intellectual and political forces needed to enact the NPT and generally creating the conditions for states to take nuclear proliferation as a serious security issue. However, doomsayers' predictions can also prove to be self-fulfilling. The participants also debated when the decision to obtain nuclear weapons is actually made, mentioning that it can be made early in the process, as it can be part of a prolonged decision based on the progress of the program; or it can be a self-perpetuating program and not a formal decision at all. Additionally a country's decision to engage in nuclear hedging and a desire for nuclear weapons are not necessarily synonymous.

Past Cases of Nuclear Reversal

>> Egypt

Maria Rost Rublee of the University of Tampa discussed Egypt's historical interest in obtaining nuclear weapons, the indicators and warnings that could have alerted the U.S. to this interest, and Egypt's ultimate decision to abandon its program. In 1954, the very year he took power, Gamal Abdel Nasser started Egypt's nuclear power program, spurred on by the creation of the Atoms for Peace program. While the nuclear program was civilian in nature, in 1960 Nasser directed the program leadership to investigate military applications, when the military component of Israel's Dimona power plant was made public. Egypt's nuclear program never got very far, however, and Anwar Sadat closed the program as part of his effort to ally with the United States and make peace with Israel. Even today, Egypt does not have a nuclear power program and only limited civilian nuclear facilities.

Rublee noted that while Egypt was working on its nuclear weapons program, a number of signs were visible for outsiders to observe—and some of these signs are visible in other countries today. For example, Egypt had a keen interest in developing a complete fuel cycle, an interest we see today in Iran. She pointed out that Nasser made numerous declarations of his intent to acquire nuclear weapons, and argued we should take seriously Brazilian comments that the best way for Brazil to achieve respect today was through nuclear weapons. Rublee discussed a potential nuclear domino effect, with Iran's program increasing the nuclear ambitions of Egypt, Turkey, and Saudi Arabia—all of whom do not want to see Iran established as the regional hegemon.

Rublee argued that ultimately a combination of external and internal factors led Egypt to give up its program, including individual and psychological factors. She agreed with Hymans that nuclear decisions are ultimately made by individuals, citing John F. Kennedy's personal appeals to Nasser as a key reason why Nasser allowed the nuclear program to flounder. She also stated that the nonproliferation regime can prevent proliferation in unpredictable ways. For example, Nasser signed the NPT not because he no longer desired nuclear weapons, but mainly in order to put diplomatic pressure on Israel so that it could proclaim itself a civilized state, unlike Israel.

>> Taiwan and South Korea

Rebecca Hersman, a scholar at the National Defense University, discussed the nuclear reversal decisions of Taiwan and South Korea, the research for which came out of a much larger study on nuclear reversal. She developed a methodology involving a unique intent and capability score for each potential nuclear power, which can be scored on a grid and even tracked over time. Hersman focused her brief on two of the eighteen cases of nuclear rollback, Taiwan and South Korea, and said that both have retained the ability to rapidly accelerate their programs, if they so chose. As to the forces that encouraged Taiwan and South Korea to roll back their programs, Hersman argued that foreign pressure to disarm and security guarantees by the United States were by far the biggest factors.

Hersman's list of top potential nuclear states included countries with explicit security agreements with the United States . Any weakening of these agreements could trigger a state to reconsider its nuclear options, as was the history of Taiwan and South Korea's nuclear programs during the 1970s and 1980s. She also noted that Brazil's nuclear rollback has been smaller than expected, and, as other panelists mentioned, Brazil is in many ways a disaffected disarmer. Kazakhstan is also, in Hersman's eyes, a potential nuclear power sitting on a large amount of fissile material and could simply be waiting for a national leader with nuclear ambitions.

One of several key factors Hersman stressed in dealing with potential proliferators is the difficulty in transitioning between U.S. administrations, since "wink and nod" side deals made by one administration often do not transfer to the next. She argued that nonproliferation efforts generally are dialed up or down, not on and off. Such almost certainly was the case with both Taiwan and South Korea. Additionally Hersman stressed that nuclear rollback is a process, not an outcome, and that hedging strategies are a key factor, creating as many decision points as possible in order to make the process of developing nuclear weapons difficult and drawn out. Hersman concluded that her nuclear worldview falls somewhere between the realist and idealist perspectives, with both playing a role in countering nuclear development.

>> Brazil

During the 1970s and early 1980s, Latin American rivals Brazil and Argentina were a significant nonproliferation concern, said George Anzelon of Lawrence Livermore National Laboratory. Both were ruled by military governments, both rejected the NPT, and both were developing sensitive fuel cycle capabilities. But by the late 1990s, through a gradual process of rapprochement, the two countries had adhered to regional and international nonproliferation agreements and verification measures.

Brazil's nuclear program began in the 1950s and expanded in the mid-1970s when Brazil signed a commercial deal to purchase eight nuclear power reactors from West Germany along with a full spectrum of fuel-cycle technology. The deal soon faltered for economic reasons, but Brazil launched a parallel nuclear program that included activities managed by the navy (gas centrifuges, naval propulsion), the air force (laser isotope separation), and the army (graphite moderated reactors). With the return of civilian rule in Argentina (1983) and Brazil (1985), Presidents Alphonsin and Sarney began work on a series of confidence-building measures that included visits to each other's uranium enrichment facilities. In 1990, new Brazilian President Collor asserted greater control over the military's nuclear program and resolved to bring transparency to its activities. Collor and Argentina's Carlos Menem pledged to establish a mutual system of nuclear material accounting and verification, to bring the Treaty of Tlatelolco into force, and to implement full-scope IAEA safeguards. All these steps were completed by 1995, and in 1998 Brazil ratified the NPT.

Several factors were crucial in Brazil's reversal. Brazil faced no serious threats to its national security. The personal leadership shown by the presidents of Brazil and Argentina also was key. Finally, technology denial, diplomatic pressure, and Brazil's economic problems all slowed technical progress, buying time for political changes to occur and for confidence-building to work without being overtaken by the early attainment of dangerous capabilities.

Anzelon noted that Brazil's nuclear reversal did not mean a reduction of technical capability or the abandonment of work on sensitive parts of the nuclear fuel cycle. Brazil shows no interest in foregoing its indigenous uranium enrichment program in favor of new international fuel supply arrangements, and it also remains unwilling to conclude an Additional Protocol to its IAEA safeguards agreement.

>> Panel Discussion

The panel discussion focused on potential changes that might cause these several "nonproliferation success" countries to reverse their decisions to roll back. Rublee discussed changes to the international nonproliferation regime, arguing that if it weakens it will be easier for countries to move up the chart both in terms of intent and capability and that if India is allowed to escape the NPT or generally become accepted as a nuclear weapons state in a legal way within the NPT framework, Brazil may be more inclined to test a nuclear device. Similarly, if Iran were to obtain nuclear weapons, and if this development were to be accepted by the international community, Brazil probably would withdraw from the NPT.

Hersman argued that personal leadership is a crucial factor in many dangerous countries including Brazil, South Africa and Kazakhstan because it can facilitate rapid change. One participant also stressed that most of the cases of nuclear reversal involved major changes in democratic institutions, and that this could serve as a key indicator. Rublee agreed with the importance of domestic political processes, saying that was a major reason Japan had not armed itself. Turkey was also discussed as a potential nuclear power, with various experts debating the intensity of Turkey's nuclear weapons ambitions.

Robert Einhorn and Rebecca Hersman.

Past Cases of Nuclear Proliferation

>> Pakistan

Retired Pakistani Brigadier General Feroz Hassan Khan, a professor at the Naval Postgraduate School, discussed the path Pakistan took in developing its nuclear program, arguing that "Pakistan's experience in initiating, developing, overseeing, and ultimately losing partial control of its nuclear weapons program provides important lessons for analysts seeking to understand new nuclear proliferators and networks." Khan focused his presentation on how well the United States understood the Pakistani program, how effective U.S. policy measures were in countering the program and what lessons can be learned from the Pakistani case in terms of warning indicators for the next generation of nuclear proliferators.

Throughout the 1960s Pakistan was the "most allied ally," of the United States, and simultaneously developing towards civilian nuclear power though the U.S. Atoms for Peace program. President Ayub Khan was skeptical of nuclear weapons, and the United States, acting through security guarantees, helped to reinforce this skepticism. Following India's "peaceful" nuclear test in 1974, however, the United States miscalculated the intensity of Pakistani insecurity, and thus missed its response, especially the switch from plutonium to highly-enriched uranium and the viability of Pakistan's gas centrifuges. In the 1980s the United States finally understood Pakistan's intentions but underestimated its resolve. Ultimately, after the Soviet invasion of Afghanistan, geopolitical and strategic considerations trumped nonproliferation efforts. In the 1990s the United States understood Pakistani efforts but failed to understand the limits of a policy based on sanctions and opprobrium. Both the United States and Pakistan failed to realize the extent to which A. Q. Khan was freelancing. Today Washington continues to underestimate Pakistani capacity to react to Indian developments.

U.S. policy measures proved fairly effective in slowing down and complicating Pakistani responses. However, this had a high cost, since it forced Pakistani scientists to learn the hard way, which ultimately created an opportunity for greedy businessmen in Europe and Asia and created the grounds for A. Q. Khan's network.

Lessons learned from the Pakistani case include that a motivated state will develop nuclear weapons given enough time if it believes in their feasibility and utility. Willing suppliers will create a network to fill supply needs if indigenous capacity cannot meet them. However, programmatic success requires secrecy and compartmentalization. In the case of a hypothetical new proliferator with sufficient capacity to produce a weapon, production may well trump oversight in the desire for secrecy, creating a huge opportunity for abuse. Additionally, even lawbreakers (like A.Q. Khan) working on a nuclear program may well enjoy significant domestic support. Finally, as demonstrated by Pakistan, strategic utility of nuclear weapons is not easily found: new nuclear powers will find it difficult to figure out how to put nuclear weapons to effective strategic uses.

NPS professor Brigadier (ret.) Feroz Hassan Khan after his presentation.

>> South Africa

Stephen Burgess of the U.S. Air War College discussed South Africa's transition away from being an ally toward being a neutral country, and how, like Pakistan, once it had acquired a nuclear weapons program South Africa had a difficult time deciding what to do with it because its major adversaries were not nuclear weapons states. Burgess discussed the importance of the psychological nationalism of leaders. In South Africa's case, paranoia that the United States was abandoning it was a significant motive for going nuclear. In this case, realism

does not fully explain South Africa's desire for nuclear weapons, since South Africa faced no major strategic threats. Realism did play a larger role in the rollback of the program.

Since very early South Africa was a major uranium producer and a participant in the Atoms for Peace program in the 1950s. In the 1960s South Africa began enriching its own uranium and began drifting away from being a U.S. ally around the time it was deciding whether or not to sign the nuclear nonproliferation treaty. The 1970s saw the situation deteriorate further as surrounding countries collapsed, sending the threat level up. Paranoia about communists and the loss of the United States as a major ally increased South Africa's sense of insecurity, thus it began to develop weapons and missiles. The United States then asserted pressure to disarm, but by then it was too late for sanctions to have much effect. U.S. pressure increased in the late 1980s, and in 1989 the apartheid government ended, South Africa signed the NPT, and in 1990 and 1991, unilaterally disarmed.

Lessons from the South Africa case include the critical role played by leaders in setting the direction of a country's strategic policy, and the unintended consequences of Western programs to promote peaceful energy, such as the Atoms for Peace program, which instead enabled foreign scientists to gain nuclear weapons technology and knowledge. Democratic reforms may prove to be a successful long-term strategy for combating the development of nuclear weapons.

Stephen Burgess and Robin Walker.

>> Iran

Mark Fitzpatrick of the International Institute for Strategic Studies describes Iran as an intelligence success story. Iran is designated a rogue nation because it really is seeking a nuclear weapons program. Fitzpatrick cited at least ten open source pieces of intelligence to make the case that Iran clearly was embarked upon a nuclear weapons program. Iran's motivations for seeking nuclear weapons include national pride and desire for prestige in both the region and the world. However, these were also applicable factors during the rule of the Shah. Additionally, Iranian leaders feel nuclear weapons would ensure the survival of an Islamic regime, both from outside threats and internal opposition. Nuclear weapons are also a strategic calculation, with four nuclear weapons states (Israel, Pakistan, India and Russia) in the vicinity. Furthermore, as the U.S. invasion of Iraq demonstrated to the world, states in that region cannot count on allies or international institutions to provide for their security.

Fitzpatrick argued that Iran was an intelligence success story because the intelligence community knew of Iran's intentions as early as 1995. Unfortunately at that time the intelligence community missed the contributions of A. Q. Khan, but it did know about Russian and Chinese assistance to the Iranian nuclear program. Since 1995 intelligence has played a crucial role in delaying Iranian efforts and has given the United States sufficient time to act to counter the Iranian program. Largely due to U.S. efforts, current estimates predict Iran is at least five to ten years from developing a working nuclear device, thus making Iran an intelligence success story.

>> Panel Discussion

The ensuing panel discussed the development of a counter proliferation toolbox so the international community knows which tools to use and which ones it should not use due to unintended consequences. Additionally, in both the Pakistani and South African cases, other countries withholding of conventional weapons due to international sanctions may have increased the target countries' desire for nuclear weapons. Despite the lifting of most sanctions Pakistan currently wants as many conventional and nuclear weapons as it can obtain. However, from an indicators and warning perspective, the level of conventional weapons generally cannot serve as an indicator of progress on a nuclear weapons program.

Lessons Learned from U.S. Nonproliferation Wins and Losses

Robert Einhorn of the Center for Science and International Security provided a more general presentation on nonproliferation. He described the "outside the beltway" impression as being that many countries want nuclear weapons; but in reality the total number of nuclear powers has not changed very much. According to Einhorn, not a single country began a nuclear weapons program in the last twenty years. The globalization and privatization of nuclear commerce, as characterized by the A.Q. Khan network, has made dissemination of nuclear knowledge much easier. Fraying bipartisan relationships with South Korea, Egypt, and Saudi Arabia have made it easier than ever for countries to obtain nuclear weapons. Many countries view nuclear proliferation as inevitable, and are now asking what they would do if their neighbors proceed in that direction. However, nuclear proliferation still requires overcoming many difficulties, including political and technological inertia.

None of the eight most recent nuclear states had joined the nuclear nonproliferation treaty as a non-nuclear state, thus Pakistan had no need to actually test a weapon or declare itself a nuclear power until India tested, and Israel has not tested that we know of and still manages to maintain a strategic ambiguity. The pathways to nuclear weapons were wide open for those states, but in the future, going nuclear will be more complicated, efforts will be more cautious, slower, more circuitous, and more covert. Dual-use facilities, nuclear hedging, not making a final decision to go for weapons and settling for less, or deciding a country's national objectives can be served by stopping short of a tested weapon all make this easier. An NPT-compliant breakout capability might be enough for many countries.

Einhorn asked whether the nonproliferation regime is unraveling, and if so what kind of policies can keep countries from defecting from the NPT. One of his conclusions was that it is necessary to send the clear message that we do not want countries to have nuclear weapons. Because nuclear proliferation occurs in specific countries, not in general, the nonproliferation regime can assert direct pressure where it is needed. The Bush administration sends the message that a difference exists between good and bad proliferators, which is a mixed message. It is important to provide powerful incentive not to have indigenous capabilities and make sure states have a reasonable belief they will be detected. Further, the nonproliferation community needs to place a higher priority on dissuading states from seeking bombs, since nonproliferation has rarely been the top foreign policy priority of any state or administration. Einhorn concluded by outlining the advantages of evaluating the potential pathways of specific possible nuclear states, arguing that this would allow the intelligence community to develop key indicators and provide more focused information to policymakers, resulting in more policy options and better decisions.

>> Panel Discussion

In the ensuing discussion panel, chair Peter Lavoy asked "what is a proliferation decision?" Lavoy argued that we are trying to dissuade movement along that decision continuum. Most of the important Indian nuclear decisions were made in the 1950s with the decision to have an autonomous program with a direct line to the prime minister. Additionally, a growing myth (which is not held by serving government authorities) in Pakistan holds that they should use extended deterrence to aid other Muslim countries, which presents a danger to the whole region. One worry is that nuclear powers, such as Pakistan could station nuclear weapons in other countries, such as Saudi Arabia, much like the United States stationed bombs in Turkey and Germany and the Soviet Union stationed missiles in Cuba during the Cold War. Finally, if the U.S. government continues to promote democracy sometimes other people will come into power with different nuclear myths, and the United States could be inadvertently empowering those people.

Kali Shelor and Mark Fitzpatrick.

Future Nuclear Proliferation Risks

>> Nuclear Proliferation in Europe: Could it Still Happen?

Bruno Tertrais of the Foundation pour la Recherche Strategique began his discussion of potential European proliferators by explaining the path taken by Europe's newest nuclear power: France. France's Fourth Republic lasted from 1946-1958, during which international status considerations trumped security concerns. No actual decision was made to produce nuclear weapons; the program continued based on small decisions and bureaucratic momentum. Once the program was operational the decision to test a device was made prior to de Gaulle's return to power in 1958, but without regime change France's program might have stayed virtual. With the start of the Fifth Republic in 1958 the U.S. security guarantee was seen as less credible and security considerations were once again dominant. Being a nuclear power in both the civilian and military realms symbolized modernity and independence.

Europe is a unique case in that, while only three countries are actual nuclear weapons states, five non-nuclear weapons states have nuclear weapons stationed on their territory and a nuclear security guarantee covers 26 countries. Many countries have been tempted to develop nuclear weapons in the past, primarily the three neutral countries not in either NATO or the Warsaw Pact, but the NATO nuclear guarantee was useful even to neutral countries such as Sweden. Those conditions and institutions still exist today, but the Warsaw Pact no longer exists as a threat, and NATO has enlarged, reducing European fears of insecurity.

While Tertrais stressed that nuclear proliferation of any sort is unlikely in Europe, he identified Turkey as the biggest long-term threat, with Ukraine and Serbia as even more unlikely and an EU member dismissed as wild speculation. If Turkey were to move toward nuclear weapons it would be in a post-2010 timeframe and follow the continued breakdown of U.S.-Turkey relations. Catalysts for Turkish proliferation would include failure to be accepted into the European Union and the continued progress of Iran's nuclear weapons program and would be exacerbated by a breakdown of the nuclear nonproliferation treaty and the United States withdrawing the nuclear weapons it has based in Turkey.

Ukraine and Serbia would also become more inclined to initiate a nuclear program if the NPT broke down and they were denied entry into NATO and the EU, with Ukraine's decision probably triggered by continued Russian-Ukrainian tensions post 2010 and Serbia triggered by increased Serbian nationalism post 2015. Tertrais' most improbably scenario involved a current EU member post-2020 following the "perfect storm" of a complete breakdown of European society, and serious military threats in the European neighborhood. If Russia became hyper nationalistic again, Finland, Sweden, and Poland might attempt to acquire nuclear weapons. If Middle Eastern proliferation spilled over into the Mediterranean Italy and Spain might arm themselves, possibly followed by secondary proliferation by Greece, Turkey and, once the nuclear taboo was broken, Germany.

Although the prospects of a European proliferator are slim, some elements are factors in all the most likely scenarios. Maintaining the U.S. nuclear security guarantee as a credible defense, even if the missile defense system becomes effective and is extended to cover Europe, is one key element in dissuading potential nuclear weapons states. Additional guarantees from France and the United Kingdom can add to this nuclear peace. Additionally, Europe itself can dissuade countries from arming themselves by allowing them to join the European Union.

>> The Middle East

Abbas Kadhim, a professor at the Naval Postgraduate School, divided potential proliferators in the Middle East into three categories: those that have formal relations with Israel (Egypt), those not directly threatened by Israel (Saudi Arabia and Qatar), and those that see themselves as in direct conflict with Israel (Iran, Syria, and possibly Lebanon). For most Middle Eastern countries, the main difficulty is obtaining nuclear weapons or even developing the scientific and industrial capacity to manufacture nuclear weapons, rather than gathering the motivation to obtain them. Countries such as Syria do not have the money or infrastructure to fabricate a nuclear explosive device and are more likely to seek chemical or possibly biological weapons to offset perceived security imbalances.

Of all the countries in the Middle East, Iran certainly possesses the most potent combination of means and motivation to obtain nuclear weapons, as evidenced by its ongoing efforts to develop a weapons production program. Iran's original flirtation with nuclear weapons in the 1970s was tolerated by the United States, including by such leaders as Richard Nixon and Henry Kissinger, before that policy was reversed following the 1979 Iranian revolution.

U.S. efforts to dissuade Middle Eastern countries from attempting to acquire nuclear weapons are made more difficult because of Washington's close relationship with Israel. Many Middle Eastern countries believe that the United States trusts Israel and not any other Middle Eastern country. One major fear prevalent in the region is the idea of regime changes in some Middle Eastern countries, whether it is designed from outside the country or within it. If Islamists gained control of Pakistan, Iran might increasingly feel the need for a Shia bomb to counter the Sunni bomb, not to mention the presumed Jewish bomb. Another worry is the potential for regime change in Egypt, which could lead to an Egyptian nuclear weapons program, particularly if the Muslim Brotherhood or Nasserite nationalists took over.

NPS professors Abbas Kadhim and Harold Trinkunas.

>> Northeast Asia

Clay Moltz, a professor at the Monterey Institute of International Studies, described Northeast Asia as a region facing significant risks of nuclear proliferation in the next decade. Northeast Asia's nuclear history includes the only two uses of nuclear weapons in Japan in 1945, the U.S. basing of over 3200 weapons in South Korea, Okinawa, Guam, the Philippines, and Taiwan during the Cold War, Soviet and Chinese nuclear positioning, efforts by South Korea and Taiwan in the 1970s to start nuclear programs, and of course North Korea's current efforts to develop nuclear weapons.

Post-Cold War predictions for the region vary greatly. Neo-realists describe bloc realignment and the potential for Japan to arm and assert itself while realists often predict military competition between states with non-status quo goals, such as China, North and South Korea and Japan. Neo-liberals argue that economic cooperation will trump security concerns in the region; and idealists predict a coming democratic peace, although communist and authoritarian governments in China, North Korea, and Russia make this a longer-term view.

In Northeast Asia, there are now positive and negative factors affecting proliferation potential. Encouraging signs include the growth of regional trade and investment, the decline of Marxism-Leninism, withdrawal of U.S. nuclear weapons from the region, and the lack of regional arms races. On the other hand, the Korean Peninsula is still without a peace treaty, Cold War security relationships have proved to be enduring, no effective regional security institutions exist, and an increasing number of states have growing nuclear know-how and motivation. This makes Northeast Asia one of regions most likely to see new nuclear states in the coming ten or twenty years. Horizontal and vertical proliferation tendencies in the region heighten the need to identify specific capabilities of each state, detect indicators of proliferation decisions, and prevent possible "trigger" events. A U.S. toolbox exists, but Washington has to be more effective at altering motivations and constraining capabilities. Moltz stressed the importance of closely watching for proliferation indicators, such as changes in declaratory policies, unusual construction, movement by top nuclear scientists , nuclear experiments or nuclear delivery vehicle tests.

Northeast Asia faces potential challenges of horizontal proliferation (new countries) as well as vertical proliferation (current nuclear powers expanding their arsenals). Any number of events could trigger proliferation of either kind.

- A nuclear test by North Korea, an event Moltz claims is 50 percent likely, would probably trigger Japan, South Korea, and possibly Taiwan to initiate nuclear weapons production programs.
- A breakdown of the nonproliferation treaty (45 percent chance) would have a similar impact. A major Chinese nuclear expansion (40 percent chance) would cause major reactions from Taiwan, Japan, and probably the United States and Russia.
- Korean reunification and the formation of an ultra-nationalist state (35 percent chance) would likely scare Japan as well as Russia, China, and the United States.
- A sudden U.S. withdrawal from the region (30 percent chance) would force Japan, ROK, and Taiwan to take responsibility for their security.
- Finally a new Russian nationalist rearmament (25 percent chance) would cause policy shifts and possible nuclear escalation from the United States and China, and probably cause Japan to arm itself.

Moltz encourages the United States to pursue new regional security initiatives, including real support for a verifiable denuclearization agreement on the on the Korean peninsula. He stressed the importance of maintaining and strengthening NPT norms and nuclear supply-side limits (including PSI) . Finally he stressed the need for revamped U.S. security policies that de-emphasize the importance of nuclear weapons and focus on collective security for the region.

Clay Moltz, Bruno Tertrais, and Michael Malley.

>> Southeast Asia

According to Michael Malley of the Naval Postgraduate School, conventional wisdom holds that Southeast Asia is not much of nuclear proliferation threat. Countries in this region do not face much of a deterrable strategic threat because large countries—Thailand, Burma, Indonesia and the Philippines—tend to be more focused on internal security problems. They lack both the economic and technical capacity to develop military nuclear programs, thus any threat that does emerge from this region would be from ungoverned spaces, not from state-led efforts. Finally, conventional wisdom says that these countries view diplomacy as more effective than military force and are parties to the Southeast Asian Nuclear Weapons-Free Zone Treaty, signed in 1995.

Rethinking the conventional wisdom, Malley stressed the changing strategic environment. Burma has made attempts to acquire a nuclear reactor from Russia and weapons technology from North Korea. In one scenario Malley laid out, Burma could prove successful in those attempts. While it may still lack the capacity to develop its own weapons it could still deploy short-range nuclear tipped missiles. Key drivers for this scenario are fear of an invasion by the United States, with lessons learned from the actions of North Korea and Iraq. The project could be funded by exports of drugs, new natural gas production, while nuclear training could be provided by Russia and North Korea as diplomatic constraints decline as energy demand grows.

Another potential threat is Indonesia, which has developed its nuclear capacity, ostensibly for electricity, and also has been improving its relations with Iran. While Indonesia has a long record of compliance with IAEA safeguards, the potential exists for a network of technical experts to grow as power plant is built and develop into an A. Q. Khan-style network within Indonesia but not led by the Indonesian government. Indonesia has expressed no interest in bombs; however, Iran has been on a diplomatic offensive toward Indonesia, aiming to build ties with the Indonesian nuclear research community, offering incentives for education, training, and economic development.

In the end, the prospects for nuclear proliferation in Southeast Asia before 2016 are slim. States generally lack the strategic interest or technical capacity to build bombs. While technical capacity is likely to grow gradually, strategic change probably will be insufficient to promote serious intent in autonomous nuclear weapons programs.

>> Latin America

Harold Trinkunas of the Naval Postgraduate School discussed potential proliferators in Latin America, specifically focusing on Argentina, Brazil and Venezuela. While in the past all three countries were interested in nuclear weapons, they later had sufficient rationale for de-nuclearization.

Both Argentina and Brazil have taken nuclear weapons production options off the table, and while both maintain civilian nuclear programs, they are about technology and modernity, not military power. Historically, Brazil sees itself as a potential power, and it uses this quest for greatness as a rationale for many of its actions. Despite that, Latin America is an isolated security environment and historically militaries in the region have been more of a threat to their own countries than to foreign powers. The regional integration of South America, both economically and in security cooperation, further decreased the likelihood of international conflict. However, Argentina and Brazil maintain their nuclear expertise and capabilities. The governing left-center coalitions have nationalistic tendencies and view nuclear power as a way to demonstrate power, modernity and technology. Through its nuclear program, Brazil has achieved energy autonomy. The possibility also remains for either Argentina or Brazil to export technology in order to earn reciprocity in other matters.

Venezuela, on the other hand, has been far more aggressive in its political rhetoric. Venezuelan president Hugo Chavez has declared interest in obtaining nuclear bombs, and has been supportive of almost any county opposing the United States, especially potential nuclear weapons states such as Iran and North Korea. Chavez considers the United States the world's primary threat and wants to pursue an asymmetric defense through conventional and nuclear means, all financed by the country's oil exports. Venezuela has good relations with many states possessing nuclear technology, including Argentina, Brazil, Iran, North Korea, and Russia. Despite all that, Venezuela currently has no nuclear program and no scientists working on related industries or technologies. Domestic obstacles include the lack of any constituency pushing for nuclear weapons and the fact that Venezuela is an oil-rich country with very little need for any civilian nuclear program. The biggest risk is probably Venezuela buying a ready-made nuclear device or product from a nuclear weapons state; but even this was judged to be a remote possibility.

>> Panel Discussion

Most people agreed that the possibility of individual European countries getting rid of their nuclear weapons is very slim, because they would never accept a central European executive power with exclusive control of those weapons.

Iran's argument for nuclear weapons has several flaws. Among them is the fact that the Iranian regime enjoys 70 percent support, but would only have twenty percent support if not for the nuclear issue. Peter Lavoy asked what effect the India-China competition will have on other potential nuclear states.

The Nuclear Energy Market and the Nonproliferation Regime

Chaim Braun of Stanford University discussed aspects of the civilian nuclear energy market and how that affects the nuclear proliferation environment. Because it takes nine to eleven years to build a nuclear power plant, the plants that will be completed by 2016 have already started. In 2016 the world will contain about ten percent more than the current 440 or so nuclear power plants, but a large number of plants may be in the early construction stages, so by 2020 the number could be far larger. Braun estimated that around 130 new reactors are currently being planned or built. The United States has nineteen new power plants planned, while China and Russia each have 40 new plants planned. However, many of these plants are replacements to modernize existing power plants.

Proliferation sensitivities from new power reactors include nuclear fuel resources, which are the least sensitive area of proliferation, and fuel cycle facilities, which are more diversion sensitive. All material diverted for weapons use comes from research reactors, not fuel reactors. The fuel supply interlinks between fresh and used fuel is the most sensitive part of the global nuclear energy system. Uranium from Gabon that is exported to France is not sensitive whereas if it is exported to Iran, India or Syria it is more sensitive. Ultimately uranium conversion plants are the choke points of the front end of the nuclear fuel cycle.

In addition to serving as potential stages in the development of nuclear materials, nuclear power plants can serve as potential weapons themselves. Fuel shipments in and out of the plant might be sensitive along the transportation route. Construction of nuclear power plants increase the nuclear knowledge level and create a cadre of trained professionals who could be diverted to a clandestine weapons program.

New trends in nuclear energy systems in the years past 2016 could include a revival of fast reactors for both burning and fuel breeding. For example, High Temperature Gas Reactors (HTGRs) could emerge with high-grade industrial heat supplies. Russia has proposed barge-mounted reactors. Other countries may develop small modular plug-in reactors. And the possibility exists for development of a thorium fuel cycle, which would significantly increase available fuel supplies.

The main problem of the global nonproliferation regime is equitable implementation of the NPT's Article IV. New concepts for improvements in global nonproliferation are now more advanced than plans for nuclear capacity growth. The resolution of the nuclear crisis with Iran will be the first test case of implementation of the new nonproliferation proposals. In principle, the nonproliferation regime could withstand the revival of nuclear energy as a primary source of energy for the world, but that has yet to be demonstrated. The U.S.-India nuclear deal (as well as possible, related Pakistan deals), and Iran's nuclear case are microcosms of all these issues. Their actual resolution will indicate future directions of the nonproliferation regime.

Chaim Braun and Bruno Tertrais.

WMD Supply Networks and Non-State Actors

James Russell of the Naval Postgraduate School discussed potential non-state proliferators of nuclear weapons and emphasized that the list of potential adversaries is far greater than just al Qaeda. Other non-state actors seeking nuclear weapons include industrial entities and trading groups, quasi-governmental organizations, non-governmental organizations, warlords and militias, transnational criminal networks, and violent non-state actors motivated by anarchist, nationalist, secular left-wing, or religious causes. Globalization makes it more difficult for governments to track or the stop world flow of nuclear materials and information. Non-state actors play a critical role in the proliferation market by providing components and services generally prohibited by states. They also are flexible and adaptive and thwart attempts at regulation.

One important question Russell examined is if we are missing the ball by focusing on the Osama bin Ladin-WMD connection? The millennial extremist waves seem to be on the decline. Religious nationalists are not really interested in weapons of mass destruction due to the difficulty of obtaining and using them, and in general they can get what they want using conventional weapons. By focusing on Osama bin Ladin and al Qaeda, the U.S. government may be missing other non-state actors that are just as dangerous.

The current thinking on proliferation to non-state actors is that it will be a direct transfer from states to non-state actors, either voluntarily or through unauthorized acquisition or theft from an existing site. Another possibility exists for indigenous production using dual-use components and either leaked or stolen materials. Proliferation in 2016 will be a buyers' market for components, and non-state to non-state transfers will become more common. However, without a whole program nuclear weapons development components are useless.

The non-state proliferation problem is more significant than many people realize, and is about more than just violent non-state actors. The state-non-state divide is creating hybrid organizations that pose a more serious proliferation problem, especially on the supply side of the nuclear marketplace. The collapse of some states has turned them into criminal organizations, such as North Korea. The next problem that might emerge is non-state to non-state transfer of WMD materials, and it is not clear what can be done about it.